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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/515,675 | 02/29/2000 | Keiji Kashima | 101309.01 | 9853 |

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EXAMINER

CHOWDHURY, TARIFUR RASHID

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2871

DATE MAILED: 05/29/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/515,675

Applicant(s)

KASHIMA, KEIJI

Examiner

Tarifur R Chowdhury

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 6, and 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (AAPA) in view of Heembrock, PN 5,870,156 and further in view of Oe et al., (Oe), USPAT 5,126,882.

The admitted prior art, as described in page 1, line 19 - page 2, line 20 and shown in Figure 18, discloses a liquid crystal display apparatus comprising a conventional back light device. The back light device comprising:

- a light source 3;
- a lightconductor 4 in a substantially plate form comprising a front face 4b(light outputting surface), a back face and side end face 4A;
- light radiated from the light source 3 is made incident on the end face 4A being outputted as a first diffused light having a directivity from the light outputting surface 4B;
- a diffusing sheet 5 for receiving, on its face, the diffused light outputted from the light outputting surface of the lightconductor 4, and outputting a second diffused light

having a directivity from a light outputting surface of the diffusing sheet opposite to the face of the diffusing sheet;

- a prism sheet 6;
- a liquid crystal cell 7; and
- a light reflecting sheet 8 which is arranged on the back face of the lightconductor.

The liquid crystal cell has a structure wherein its front and back faces are sandwiched by polarizing plates 9A and 9B.

The admitted prior art as described in page 3, lines 15-27, further discloses that when a liquid crystal cell is sandwiched by polarizing plates about 50% of incident light gets absorbed by the polarizers. Therefore, the efficiency for using light is low.

Page 4, lines 1-23 of the admitted prior art, further discloses that by employing a polarized beam splitter to separate non-polarized light from a light source into two linearly polarized light beams wherein one polarized light is outputted directly toward a liquid crystal and the other polarized light is reflected, the efficiency for using light can be improved. Therefore, it would have been obvious to one of ordinary skill in the art to substitute the polarizers for a polarizing beam splitter in Figure 18 of the admitted prior art in order to improve efficiency for using light.

Therefore, the structure of the backlight device discloses in the admitted prior art of this present application is similar to the present invention except that the light outputting surface of the diffusing sheet is rougher. However, Heembrock discloses in column 1, lines 21-25 that by employing a diffuser having a roughened or frosted

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surface, it is possible to improve the uniformity of the backlighting. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to substitute the diffuser of the admitted prior art back light device in order to improve the uniformity of the backlighting. Further, since the diffuser is not directly attached to the light conductor the limitation such as "light radiated from the light source and made incident on the one of the side end faces output as a first diffused light having a peak oblique to the normal standing on a light outputting surface therefrom which is the front face;" would have been obvious.

Still lacking is the limitation of the light diffusing sheet having a haze value of 30% or more. However, Oe discloses that when the haze value is higher than about 30%, a sufficient luminance can be obtained (col. 20, lines 52-55). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the diffusing sheet of the admitted prior art when modified by Heembrock such that it has a haze value in the range of 30% or more so that sufficient luminance is obtained.

Accordingly, claims 1 and 6 would have been obvious.

As to claims 11 and 12, since the modified display of the admitted prior art includes a diffuser having a rougher light outputting surface, the limitation such as the light diffusion effects of the first diffused light caused by the lightconductor is different or lower than the second diffused light caused by the light diffusing sheet would have been obvious.

Accordingly, claims 11 and 12 would have been obvious

As to claims 13 and 14, even though applicant's admitted prior art does not explicitly disclose that the light reflectivity of the light reflecting sheet is 70% or more, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ a reflector that has a light reflectivity of 70% or more to optimize device performance.

Claims 2 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art in view of Heembrock and Oe as applied to claims 1, 6, and 11-14 above and further in view of Yokota, PN 5,748,369.

The admitted prior art does not explicitly disclose that the polarized beam splitting sheet is a laminated body having 3 or more layers wherein the layers having different refractive indexes. However, Yokota evidences in column 1, lines 25-30 and shows that a conventional polarized beam splitter comprises a number of (4 in Figure 2) thin glass plates arranged parallel to one another. Even though Yokota does not explicitly disclose that the refractive indexes of the glass plates are different, for the polarized beam splitter to work the refractive indexes of the glass plates must be different. Inherently, polarized beam splitters separates light beam into P and S polarized light beams wherein one of the light beam is transmitted through the sheet and the other is reflected on the sheet, thereby splitting both of the polarized light beams. Accordingly, claims 2 and 7 would have been obvious.

Claims 3 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art in view of Heembrock and Oe as applied to

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claims 1, 6, and 11-14 above in view of Broer et al (hereinafter Broer), PN 5,793,456.

The admitted art fails to disclose that the polarized beam splitting sheet includes a circularly polarized light selecting layer comprising a cholesteric layer and a $1/4$ phase differentiation layer. However, Broer discloses in column 1, lines 35-58 that by means of cholesteric polarizers it is possible to very efficiently convert unpolarized light into polarized light. Such polarizers comprise an optically active layer of a cholesteric material. If this type of polarizers is irradiated with a beam of unpolarized light the part of the light, which is compatible with, the (right-handed or left-handed) direction and pitch of the helix is reflected, while the remainder of the light is transmitted. By using this type of polarizer, theoretically 100% of incident unpolarized light can be converted into circularly polarized light. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to employ a polarized beam splitter having a cholesteric layer in the admitted prior art in order covert about 100% of the unpolarized light into circularly polarized light.

Broer does not explicitly disclose that the cholesteric polarizer further comprises a $1/4$ phase differentiation plate. However, it is well known in the art that a $1/4$ phase differentiation plate converts circularly polarized light into linearly polarized light. Therefore, it would have been obvious to one of ordinary skill in the art to further employ a $1/4$ phase differentiation plate in the cholesteric polarizer of Broer in order to further convert the circularly polarized light into linearly polarized light thus obtaining maximum transmittance.

Accordingly, claims 3 and 8 would have been obvious.

Claims 1, 4-6 and 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ouderkirk et al (hereinafter Ouderkirk), PCT WO 95/17692 in view of Farrell, PN 5,143,433 and Heembrock and Oe.

Ouderkirk discloses in page 4, line 7 - page 5, line 13 and shows in Figure 2, an optical display 11 comprising:

- a three layer LCD assembly 15 that includes a front polarizer 18, a liquid crystal 20 and a rear polarizer 23;
- a light source 30;
- a light guide 34;
- a diffusely reflective layer 39; and
- a reflective polarizer 12.

Ouderkirk fails to disclose a light diffusing sheet for receiving light outputted from the light outputting surface of the light guide. However, Farrell discloses in column 5, lines 7-11 that as a general rule, a diffuser plate is placed in the path of the backlighting rays before they reach LCD. The diffuser tends to smooth out the light intensity to aid in obtaining even intensity across the entire surface of the LCD. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to employ a diffuser for receiving light outputted from the light outputting surface of the lightconductor in order to obtain even intensity across the entire surface area of the LCD.

Further, Farrell does not explicitly disclose that the light outputting surface of the diffuser is rougher. However, Heembrock discloses in column 1, lines 21-25 that by employing a diffuser having a roughened or frosted surface, it is possible to improve the uniformity of the backlighting. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to substitute the diffuser of the admitted prior art back light device in order to improve the uniformity of the backlighting.

Further, since the diffuser is not directly attached to the light conductor the limitation such as "light radiated from the light source and made incident on the one of the side end faces output as a first diffused light having a peak oblique to the normal standing on a light outputting surface therefrom which is the front face;" would have been obvious.

Still lacking is the limitation of the light diffusing sheet having a haze value of 30% or more. However, Oe discloses that when the haze value is higher than about 30%, a sufficient luminance can be obtained (col. 20, lines 52-55). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the diffusing sheet of the admitted prior art when modified by Heembrock such that it has a haze value in the range of 30% or more so that sufficient luminance is obtained.

Accordingly, claims 1, 5, 6 and 10 would have been obvious.

As to claims 4 and 9, Ouderkirk discloses in page 5, line 26 - page 6, line 25 and shows in Figure 4 that the reflective polarizer 12 is made of alternating layers of two different materials. Therefore, it is clear from the Figure 4 that the reflective polarizer 12,

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which is functionally equivalent to a polarized beam splitter, has a planar structure having three or more layers each of which has double refraction. Accordingly, claims 4 and 9 would have been obvious.

As to claims 11 and 12, since the modified display of the admitted prior art includes a diffuser having a rougher light outputting surface, the limitation such as the light diffusion effects of the first diffused light caused by the lightconductor is different or lower than the second diffused light caused by the light diffusing sheet, is inherent.

Accordingly, claims 11 and 12 would have been obvious

As to claims 13 and 14, even though Ouderkirk does not explicitly disclose that the light reflectivity of the light reflecting sheet is 70% or more, it would have been obvious to one of ordinary skill in the art at the time of the invention to employ a reflector that has a light reflectivity of 70% or more to optimize device performance.

Response to Arguments

Applicant's arguments with respect to claims 1-14 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tarifur R Chowdhury whose telephone number is (703) 308-4115. The examiner can normally be reached on M-Th (6:30-5:00) Friday Off.

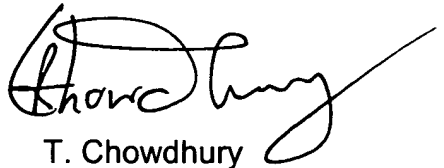
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William L Sikes can be reached on (703) 305-4842. The fax phone numbers for the organization where this application or proceeding is assigned are (703)

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308-7724 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

TRC
May 28, 2002



T. Chowdhury
Patent Examiner
Technology Center 2800